

SEQUENCE LISTING

<110> The Board of Control of
Michigan Technological University et al.

<120> GENETIC ENGINEERING OF LIGNIN BIOSYNTHESIS IN PLANTS

<130> 881.003WO1

<140>

<141> Herewith

<150> 08/969,046

<151> 1997-11-12

<160> 17

<170> FastSEQ for Windows Version 3.0

<210> 1

<211> 1915

<212> DNA

<213> Populus tremuloides Michx. (aspen)

<220>

<221> CDS

<222> (83)...(1687)

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Met Asn Pro Gln Glu Phe Ile Phe Arg Ser
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aaa tta cca gac atc tac atc ccg aaa aac ctt ccc ctg cat tca tac 160
Lys Leu Pro Asp Ile Tyr Ile Pro Lys Asn Leu Pro Leu His Ser Tyr
15 20 25

gtt ctt gag aac ttg tct aaa cat tca tca aaa cct tgc ctg ata aat 208
Val Leu Glu Asn Leu Ser Lys His Ser Ser Lys Pro Cys Leu Ile Asn
30 35 40

ggc gcg aat gga gat gtc tac acc tat gct gat gtt gag ctc aca gca 256
Gly Ala Asn Gly Asp Val Tyr Thr Tyr Ala Asp Val Glu Leu Thr Ala
45 50 55

aga aga gtt gct tct ggt ctg aac aag att ggt att caa caa ggt gac 304
Arg Arg Val Ala Ser Gly Leu Asn Lys Ile Gly Ile Gln Gln Gly Asp
60 65 70

gtg atc atg ctc ttc cta cca agt tca cct gaa ttc gtg ctt gct ttc 352
Val Ile Met Leu Phe Leu Pro Ser Ser Pro Glu Phe Val Leu Ala Phe
75 80 85 90

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Leu Gly Ala Ser His Arg Gly Ala Met Ile Thr Ala Ala Asn Pro Phe
95 100 105

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09530553-03400

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Arg	Glu	Ser	Asp	Val	Lys	Val	Met	Cys	Val	Asp	Ser	Ala	Pro	Asp	Gly					
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Gln	Val	Asp	Ile	Ser	Pro	Asp	Asp	Val	Val	Ala	Leu	Pro	Tyr	Ser	Ser					
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Ile	Thr	Ser	Val	Ala	Gln	Gln	Val	Asp	Gly	Asp	Asn	Pro	Asn	Leu	Tyr					
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Phe	His	Ser	Glu	Asp	Val	Ile	Leu	Cys	Val	Leu	Pro	Met	Phe	His	Ile					
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tat	gct	ctg	aat	tca	atg	atg	ctc	tgt	ggg	ctg	aga	ggt	ggg	gcc	tcg				832	
Tyr	Ala	Leu	Asn	Ser	Met	Met	Leu	Cys	Gly	Leu	Arg	Val	Gly	Ala	Ser					
				235				240				245				250				
att	ttg	ata	atg	cca	aag	ttt	gag	att	ggg	tct	ttg	ctg	gga	ttg	att				880	
Ile	Leu	Ile	Met	Pro	Lys	Phe	Glu	Ile	Gly	Ser	Leu	Leu	Gly	Leu	Ile					
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gag	aag	tac	aag	gta	tct	ata	gca	cca	ggt	ggt	cca	cct	gtg	atg	atg				928	
Glu	Lys	Tyr	Lys	Val	Ser	Ile	Ala	Pro	Val	Val	Pro	Pro	Val	Met	Met					
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Ala	Ile	Ala	Lys	Ser	Pro	Asp	Leu	Asp	Lys	His	Asp	Leu	Ser	Ser	Leu					
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Thr	Val	Arg	Ala	Lys	Phe	Pro	Gln	Ala	Arg	Leu	Gly	Gln	Gly	Tyr	Gly					
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Asn Gln Pro Gly Glu Ile Cys Ile Arg Gly Asp Gln Ile Met Lys Gly
380 385 390

tat ctt aat gac ccc gag gca acc tca aga aca ata gac aaa gaa gga 1312
Tyr Leu Asn Asp Pro Glu Ala Thr Ser Arg Thr Ile Asp Lys Glu Gly
395 400 405 410

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Trp Leu His Thr Gly Asp Ile Gly Tyr Ile Asp Asp Asp Asp Glu Leu
415 420 425

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Phe Ile Val Asp Arg Leu Lys Glu Leu Ile Lys Tyr Lys Gly Phe Gln
430 435 440

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445 450 455

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460 465 470

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Pro Val Ala Phe Val Val Lys Ser Glu Lys Ser Gln Ala Thr Glu Asp
475 480 485 490

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Glu Ile Lys Gln Tyr Ile Ser Lys Gln Val Ile Phe Tyr Lys Arg Ile
495 500 505

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Lys Arg Val Phe Phe Ile Glu Ala Ile Pro Lys Ala Pro Ser Gly Lys
510 515 520

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Ile Leu Arg Lys Asn Leu Lys Glu Lys Leu Pro Gly Ile
525 530 535

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tgaaccaagc atgcttgaa aagacacgta cccaacgtaa gacagttact gttcctagta 1817
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<212> PRT

<213> Populus tremuloides Michx. (aspen)

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00420"2302560

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Leu	Asn	Lys	Ile	Gly	Ile	Gln	Gln	Gly	Asp	Val	Ile	Met	Leu	Phe	Leu
Pro	Ser	Ser	Pro	Glu	Phe	Val	Leu	Ala	Phe	Leu	Gly	Ala	Ser	His	Arg
Gly	Ala	Met	Ile	Thr	Ala	Ala	Asn	Pro	Phe	Ser	Thr	Pro	Ala	Glu	Leu
Ala	Lys	His	Ala	Lys	Ala	Ser	Arg	Ala	Lys	Leu	Leu	Ile	Thr	Gln	Ala
Cys	Tyr	Tyr	Glu	Lys	Val	Lys	Asp	Phe	Ala	Arg	Glu	Ser	Asp	Val	Lys
Val	Met	Cys	Val	Asp	Ser	Ala	Pro	Asp	Gly	Ala	Ser	Leu	Phe	Arg	Ala
His	Thr	Gln	Ala	Asp	Glu	Asn	Glu	Val	Pro	Gln	Val	Asp	Ile	Ser	Pro
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Lys	Gly	Val	Met	Leu	Thr	His	Lys	Gly	Leu	Ile	Thr	Ser	Val	Ala	Gln
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Phe	Glu	Ile	Gly	Ser	Leu	Leu	Gly	Leu	Ile	Glu	Lys	Tyr	Lys	Val	Ser
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Pro	Gln	Ala	Arg	Leu	Gly	Gln	Gly	Tyr	Gly	Met	Thr	Glu	Ala	Gly	Pro
Val	Leu	Ala	Met	Cys	Leu	Ala	Phe	Ala	Lys	Glu	Pro	Phe	Asp	Ile	Lys
Pro	Gly	Ala	Cys	Gly	Thr	Val	Val	Arg	Asn	Ala	Glu	Met	Lys	Ile	Val
Asp	Pro	Glu	Thr	Gly	Val	Ser	Leu	Pro	Arg	Asn	Gln	Pro	Gly	Glu	Ile
Cys	Ile	Arg	Gly	Asp	Gln	Ile	Met	Lys	Gly	Tyr	Leu	Asn	Asp	Pro	Glu
Ala	Thr	Ser	Arg	Thr	Ile	Asp	Lys	Glu	Gly	Trp	Leu	His	Thr	Gly	Asp
Ile	Gly	Tyr	Ile	Asp	Asp	Asp	Asp	Glu	Leu	Phe	Ile	Val	Asp	Arg	Leu
Lys	Glu	Leu	Ile	Lys	Tyr	Lys	Gly	Phe	Gln	Val	Ala	Pro	Thr	Glu	Leu
Glu	Ala	Leu	Leu	Ile	Ala	His	Pro	Glu	Ile	Ser	Asp	Ala	Ala	Val	Val
Gly	Leu	Lys	Asp	Glu	Asp	Ala	Gly	Glu	Val	Pro	Val	Ala	Phe	Val	Val
Lys	Ser	Glu	Lys	Ser	Gln	Ala	Thr	Glu	Asp	Glu	Ile	Lys	Gln	Tyr	Ile
Ser	Lys	Gln	Val	Ile	Phe	Tyr	Lys	Arg	Ile	Lys	Arg	Val	Phe	Phe	Ile
Glu	Ala	Ile	Pro	Lys	Ala	Pro	Ser	Gly	Lys	Ile	Leu	Arg	Lys	Asn	Leu

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Lys Glu Lys Leu Pro Gly Ile
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<213> Populus tremuloides Michx. (aspen)
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Pro	Gln	Asn	Gln	Asn	Ala	Pro	Ser	Ser	His	Glu	Thr	Asp	His	Ile	Phe	
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Arg	Ser	Lys	Leu	Pro	Asp	Ile	Thr	Ile	Ser	Asn	Asp	Leu	Pro	Leu	His	
		35					40					45				
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Ile	Ser	Gly	Ser	Thr	Gly	Lys	Thr	Tyr	Ser	Phe	Ala	Glu	Thr	His	Leu	
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Ile	Ser	Arg	Lys	Val	Ala	Ala	Gly	Leu	Ser	Asn	Leu	Gly	Ile	Lys	Lys	
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ggc	gat	gta	atc	atg	acc	ctg	ctc	caa	aac	tgc	cca	gaa	ttc	gtc	ttc	336
Gly	Asp	Val	Ile	Met	Thr	Leu	Leu	Gln	Asn	Cys	Pro	Glu	Phe	Val	Phe	
			100					105					110			
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cct	ttc	tac	act	caa	agt	gaa	ata	ttc	aag	caa	ttc	tct	gct	tct	cgt	432
Pro	Phe	Tyr	Thr	Gln	Ser	Glu	Ile	Phe	Lys	Gln	Phe	Ser	Ala	Ser	Arg	
	130					135					140					
gcg	aaa	ctg	att	atc	acc	cag	tct	caa	tat	gtg	aac	aag	cta	gga	gat	480
Ala	Lys	Leu	Ile	Ile	Thr	Gln	Ser	Gln	Tyr	Val	Asn	Lys	Leu	Gly	Asp	
145					150					155					160	
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Ser	Asp	Cys	His	Glu	Asn	Asn	Gln	Lys	Pro	Gly	Glu	Asp	Phe	Ile	Val	
				165					170					175		
atc	acc	att	gat	gac	ccg	cca	gag	aac	tgt	cta	cat	ttc	aat	gtg	ctt	576
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gcg cca ctg ggg aag gag ctc gag gac gcc ctc agg agc agg gtt cct Ala Pro Leu Gly Lys Glu Leu Glu Asp Ala Leu Arg Ser Arg Val Pro 340 345 350			1056
cag gcc atc ctg gga cag ggt tat ggg atg aca gag gcc ggg cct gtg Gln Ala Ile Leu Gly Gln Gly Tyr Gly Met Thr Glu Ala Gly Pro Val 355 360 365			1104
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7

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 Gly Tyr Val Asp Asp Asp Asp Glu Ile Phe Ile Val Asp Arg Val Lys
 450 455 460

gaa atc ata aaa ttc aaa ggc ttc cag gtg ccg cca gcg gag ctt gag 1440
 Glu Ile Ile Lys Phe Lys Gly Phe Gln Val Pro Pro Ala Glu Leu Glu
 465 470 475 480

gct ctc ctt gta aac cac cct tca att gcg gat gcg gct gtt gtt ccg 1488
 Ala Leu Leu Val Asn His Pro Ser Ile Ala Asp Ala Ala Val Val Pro
 485 490 495

caa aaa gac gag gtt gct ggt gaa gtt cct gtc gcg ttt gtg gtc cgc 1536
 Gln Lys Asp Glu Val Ala Gly Glu Val Pro Val Ala Phe Val Val Arg
 500 505 510

tca gat gat ctt gac ctt agt gaa gag gct gta aaa gaa tac att gca 1584
 Ser Asp Asp Leu Asp Leu Ser Glu Glu Ala Val Lys Glu Tyr Ile Ala
 515 520 525

aag cag gtg gtg ttc tac aag aaa ctg cac aag gtg ttc ttc gtt cat 1632
 Lys Gln Val Val Phe Tyr Lys Lys Leu His Lys Val Phe Phe Val His
 530 535 540

tct att ccc aaa tcg gct tct gga aag att cta aga aaa gac ctc aga 1680
 Ser Ile Pro Lys Ser Ala Ser Gly Lys Ile Leu Arg Lys Asp Leu Arg
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<210> 4

<211> 570

<212> PRT

<213> Populus tremuloides Michx. (aspen)

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 35 40 45
 Ala Tyr Cys Phe Glu Asn Leu Ser Asp Phe Ser Asp Arg Pro Cys Leu
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 Ile Ser Gly Ser Thr Gly Lys Thr Tyr Ser Phe Ala Glu Thr His Leu
 65 70 75 80
 Ile Ser Arg Lys Val Ala Ala Gly Leu Ser Asn Leu Gly Ile Lys Lys
 85 90 95
 Gly Asp Val Ile Met Thr Leu Leu Gln Asn Cys Pro Glu Phe Val Phe
 100 105 110
 Ser Phe Ile Gly Ala Ser Met Ile Gly Ala Val Ile Thr Thr Ala Asn
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<213> Populus tremuloides Michx. (aspen)
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ttcaccaacc	cccgctctcc	gtgccagcca	attctatatc	agcaggaatg	ctctgcactc	1080
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<212> DNA

<213> Populus tremuloides Michx. (aspen)

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